

**CLAIMS:**

1. A method of separating dimethyl ether from an olefin stream made from an oxygenate to olefin reaction process, comprising:  
contacting oxygenate with a molecular sieve catalyst to form the olefin stream, wherein the olefin stream comprises water, propylene, propane, and dimethyl ether;  
drying the olefin stream; and  
distilling the dried olefin stream to separate the dimethyl ether and propane from the propylene.
2. The method of claim 1, wherein the dried olefin stream contains not greater than 1,000 wppm water.
3. The method of claim 2, wherein the dried olefin stream contains not greater than 500 wppm water.
4. The method of claim 3, wherein the dried olefin stream contains not greater than 10 wppm water.
5. The method of claim 1, wherein the propylene distilled from the dried olefin stream is substantially free of dimethyl ether.
6. The method of claim 1, wherein the propylene distilled from the dried olefin stream contains not greater than 25 wppm dimethyl ether.
7. The method of claim 6, wherein the propylene distilled from the dried olefin stream contains not greater than 10 wppm dimethyl ether.
8. The method of claim 7, wherein the propylene distilled from the dried olefin stream contains not greater than 1 wppm dimethyl ether.

9. The method of claim 8, wherein the propylene distilled from the dried olefin stream contains not greater than 0.5 wppm dimethyl ether.
10. The method of claim 2, wherein the olefin stream contains at least 0.05 wt % dimethyl ether.
11. The method of claim 1, wherein the olefin stream further comprises butylene and higher boiling point compounds and the dried olefin stream is distilled to separate the dimethyl ether and propane from the propylene, butylene and higher boiling point compounds.
12. The method of claim 1, further comprising contacting the propane and dimethyl ether with water to separate the dimethyl ether from the propane.
13. The method of claim 11, further comprising contacting the separated dimethyl ether with a molecular sieve catalyst to form an olefin.
14. The method of claim 11, wherein the olefin stream comprises from 2 wt % to 45 wt % propane, from 0.05 to 5 wt % dimethyl ether, and from 30 wt % to 95 wt % butylene plus higher boiling point compounds.
15. The method of claim 1, further comprising polymerizing the separated propylene to form polypropylene.
16. The method of claim 11, further comprising separating the butylene and higher boiling point compounds from the propylene.
17. The method of claim 16, further comprising converting the separated butylene into aldehydes, acids, alcohols, esters made from C<sub>5</sub>-C<sub>13</sub> mono carboxylic acids and C<sub>5</sub>-C<sub>13</sub> mono alcohols or linear alpha olefins.

18. The method of claim 1, wherein the olefin stream further comprises ethylene and the dried olefin stream is distilled to separate the dimethyl ether and propane from the ethylene and propylene.
19. The method of claim 18, further comprising polymerizing the separated ethylene.
20. A method of removing dimethyl ether from an olefin stream, comprising: providing an olefin stream which comprises water, propylene, propane and dimethyl ether; drying the olefin stream; distilling the dried olefin stream so as to separate out the propane and dimethyl ether from the propylene, wherein the propane and dimethyl ether stream comprises from 4.0 to 99 wt % propane and from 1.0 to 96 wt % dimethyl ether.
21. The method of claim 20, wherein the provided olefin stream comprises at least 0.05 wt % dimethyl ether.
22. The method of claim 20, wherein the olefin stream is dried by contacting the olefin stream with water absorbent.
23. The method of claim 22, wherein the water absorbent is a polar hydrocarbon.
24. The method of claim 20, wherein the olefin stream is dried by contacting the olefin stream with a water adsorbent.
25. The method of claim 24, wherein the water adsorbent is a molecular sieve.
26. The method of claim 22, wherein the provided olefin stream is compressed prior to contacting with water absorbent.

27. The method of claim 20, further comprising contacting the propane and dimethyl ether stream with water so as to separate the dimethyl ether from the propane.
28. The method of claim 27, further comprising contacting the separated dimethyl ether with a molecular sieve catalyst to form an olefin.
29. The method of claim 20, further comprising polymerizing the separated propylene.
30. The method of claim 20, wherein the olefin stream further comprises ethylene and the dried olefin stream is distilled to separate the dimethyl ether and propane from the ethylene and propylene.
31. The method of claim 30, further comprising polymerizing the separated ethylene.
32. A method of polymerizing propylene made from an oxygenate, comprising:  
contacting the oxygenate with a molecular sieve catalyst to form an olefin stream, wherein the olefin stream comprises propylene, propane, and dimethyl ether;  
distilling the olefin stream to separate the propylene from the propane and dimethyl ether; and  
polymerizing the separated propylene.
33. The method of claim 32, wherein the olefin stream comprises at least 0.05 wt.% dimethyl ether.
34. The method of claim 32, wherein the separated propylene stream is substantially free of dimethyl ether.

35. The method of claim 32, wherein the separated propylene stream contains not greater than 25 wppm dimethyl ether.
36. The method of claim 32, wherein the propylene distilled from the dried olefin stream contains not greater than 10 wppm dimethyl ether.
37. The method of claim 36, wherein the propylene distilled from the dried olefin stream contains not greater than 1 wppm dimethyl ether.
38. The method of claim 37, wherein the propylene distilled from the dried olefin stream contains not greater than 0.5 wppm dimethyl ether.
39. The method of claim 32, wherein the olefin stream further comprises butylene and higher boiling point compounds and the removing step further comprises removing propylene from butylene and higher boiling point compounds.
40. The method of claim 32, further comprising drying the olefin stream prior to distilling.
41. The method of claim 32, wherein the olefin stream comprises at least about 0.05 wt % dimethyl ether.
42. The method of claim 32, wherein the olefin stream further comprises butylene and higher boiling point compounds and the dried olefin stream is distilled to separate the dimethyl ether and propane from the propylene, butylene and higher boiling point compounds.
43. The method of claim 32, further comprising contacting the propane and dimethyl ether with water to separate the dimethyl ether from the propane.

44. The method of claim 43, further comprising contacting the separated dimethyl ether with a molecular sieve catalyst to form an olefin.
45. A method of polymerizing ethylene and propylene, comprising:  
drying an olefin stream which comprises ethylene, propylene, propane and dimethyl ether;  
distilling the dried olefin stream to separate out an ethylene stream, a propylene stream, and a propane and dimethyl ether stream, wherein the ethylene stream and the propylene stream each contain not greater than 10 wppm dimethyl ether; and  
polymerizing the separated ethylene and propylene streams.
46. The method of claim 45, wherein the dried olefin stream contains not greater than 1,000 wppm water.
47. The method of claim 46, wherein the dried olefin stream contains not greater than 500 wppm water.
48. The method of claim 47, wherein the dried olefin stream contains not greater than 10 wppm water.
49. The method of claim 46, wherein the separated propane and dimethyl ether stream contains from 4.0 to 99 wt % propane and from 1.0 to 96 wt % dimethyl ether.
50. The method of claim 46, further comprising contacting the separated propane and dimethyl ether stream with water so as to separate the dimethyl ether from the propane.
51. The method of claim 50, further comprising contacting the separated dimethyl ether with a molecular sieve catalyst to form an olefin.

52. A method for processing an olefin-containing product stream that contains dimethyl ether as by-product, where the product stream is sent to fractionation, optionally after dewatering, compression and drying, which is characterized by the fact that at least one partial stream chiefly containing C<sub>3</sub> hydrocarbons is produced from the product stream by fractionation and this partial stream is sent to a rectification column (C3 splitter) for separation of propylene and propane, where a propylene product stream is taken from the top of this rectification column and propane and optionally other C<sub>3</sub> hydrocarbons as well as the dimethyl ether are taken from the bottom of this rectification column, so that a propylene product stream that contains at most only traces of dimethyl ether is obtained.
53. A method as in Claim 52, which is characterized by the fact that the propylene product stream contains less than 6 ppm, especially less than 3 ppm, dimethyl ether.